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APPENDIX XI

AGRICULTURAL INCOMES AND THE IMPACTS OF POTENTIAL DEVELOPMENT SEVIER RIVER BASIN, UTAH



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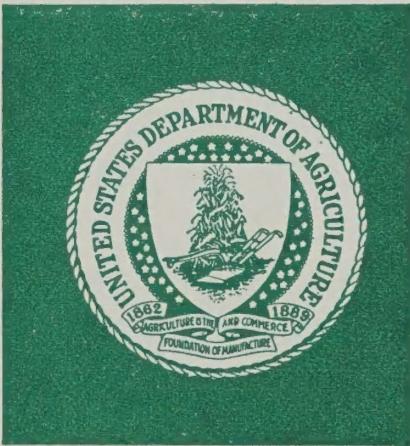
United States Department of Agriculture
Economic Research Service Forest Service Soil Conservation Service
Salt Lake City, Utah

May 1969

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FOREWARD

In 1960, the U. S. Department of Agriculture and the State of Utah began a cooperative study of the problems of land and water resource use and possibilities for development in the Sevier River Basin. The work was carried out under the authority in Section 6, Public Law 566, as amended. Three services (Economic Research Service, Forest Service, and Soil Conservation Service) within the Department of Agriculture participated.

Guidance for the Sevier River Basin Investigation has been provided by the U. S. Department of Agriculture Field Advisory Committee.

The author acknowledges the help received from the Agricultural Stabilization and Conservation Service, Bureau of Land Management, Forest Service, and Soil Conservation Service in providing and helping compile data. A special thanks is due to the many farmers in the area who willingly provided information about their farming operations.

SUMMARY

The total available farm land resource includes 1,086,000 acres of land. Of this area, 283,290 are irrigated and the remaining is dryland.

The availability of water is the limiting factor in the development of the Basin economy. The total water resource available to farmers is 1,148,380 acre-feet. Further development of the area is limited to better utilization of this available supply.

Present average agricultural income is \$5,481. After a return to capital of \$4,084, farmers receive \$1,397 as a return to their labor and management.

Development of recommended farm improvement practices on presently irrigated lands would result in \$482,000 increased annual income to farmers. Over the 50-year period this would result in \$31.5 million additional income to the local economy.

With development of all farm resources there would be an additional \$3,351,600 annual income available to offset the investment required to develop off-farm resources to provide an additional 383,700 acre-feet of water needed at the point of diversion. Over the 50-year evaluation period this development would add \$219.6 million additional income to the local economy and \$335.2 million to the State economy. Employment would be increased by 208 jobs in agriculture and 335 secondary service jobs.

AGRICULTURAL INCOMES AND THE IMPACTS OF POTENTIAL
DEVELOPMENT, SEVIER RIVER BASIN, UTAH ^{1/}

INTRODUCTION

PURPOSE

This study appraises the present and potential agricultural uses of water and related land resources and identifies the impacts of investment in development projects on agricultural incomes and the economy of the Sevier River Basin. The economic analyses had four primary objectives: (1) Appraisal of prospective farm incomes with the present water and related land resource-use pattern; (2) appraisal of prospective farm incomes and impacts with present water and land-use patterns and installation of recommended farm improvement practices; (3) appraisal of prospective farm incomes and impacts with full development of all available farm resources; and (4) to determine the value of irrigation water developed from off-farm projects and practices.

FRAMEWORK FOR STUDY

The agricultural economic appraisal was done within the framework of the foreseeable short-term and long-term development opportunities within the Basin. Short-term opportunities are developments that should be completed within the next 10 to 15 years. The primary short-term objective is to alleviate irrigation water shortages on presently irrigated lands.

Long-term opportunities relate to developments that should be completed within the next 50 years. These opportunities would provide irrigation water for all presently irrigated and irrigable lands under irrigation systems.

The study was a reconnaissance investigation of the water and related land resources. Emphasis was placed on the use and distribution of these resources and how changes in the use of available

^{1/} Prepared by David L. Wilson, Economic Research Service representative on the U.S. Department of Agriculture River Basin Field Party, as a portion of the study of the water and related land resources of the Sevier River Basin.

resources could improve the economy of the area. It centered around the occurrence and use of water resources, since it was recognized as the limiting resource. Land resources were studied as they relate to water.

T H E S T U D Y A R E A

The area includes 5,200,000 acres in south-central Utah. The Sevier River Basin is a major landlocked system within the Great Basin. Fifty percent of the area is mountainous and is the primary source of irrigation water. About 10 percent of the area is irrigated crop and wetland areas. The remaining area is primarily valley and desert rangeland.

The climate is semiarid with precipitation ranging from 6 to 13 inches in the irrigated areas. The growing season varies from 98 to 178 days. Elevation varies from 4,550 feet in the desert area to nearly 12,200 on the highest mountains. The irrigated agricultural activities are located in the relatively long and narrow mountain valleys and in the desert area near Delta. There is some dryland farming in the upper Sanpete Valley and Scipio and Levan areas.

LAND RESOURCES

Total farm land resources are 1,086,000 acres. Irrigated cropland acreage included 283,290 acres of which 258,357 acres were rotation cropland and 24,933 acres nonrotation cropland. Nonirrigated wet areas included were 108,000 acres. The farm grazing areas included 134,290 acres of phreatophyte pasture area and 559,620 acres of dry pasture. Potentially irrigable lands under present irrigation systems were 70,350 acres. These lands are presently dry pasture areas. Figures given here are gross and include areas used for canals, ditches, fences, roads and farmsteads.

WATER RESOURCES

Availability of water is the limiting resource in development or expansion of the economy. The usable water resource is relatively small in relation to the total water resource. The total water resource (total precipitation) is about 6.5 million acre-feet. Only 1,148,380 acre-feet of the total resource is available for irrigated crop production. Tributary stream and groundwater flows provide 749,980 acre-feet of irrigation water to be diverted for crop production. An additional 398,400 acre-feet are available through precipitation on cropland areas. All the remaining water resource is maintained and consumptively used by on-site watershed vegetation or diverted out of the Basin and consequently not available to the cropland areas.

The amount of water available for cropland use after diversions out of the Basin is 1,103,540 acre-feet. This resource is presently being used in the following manner: (1) Irrigated rotation cropland, 511,250 acre-feet; (2) irrigated wet meadows and pastures, 53,940 acre-feet; (3) domestic uses, 8,740 acre-feet; (4) evaporation from water surface areas, 107,750 acre-feet; (5) nonirrigated wet meadow and pastures, 263,210 acre-feet; and (6) low-value phreatophyte areas, 158,650 acre-feet. Development opportunities need to be made within the framework of the above uses. For example, a project designed to increase consumptive use of water in an irrigated cropland area would have to be accomplished by transferring water use from phreatophyte or wet areas.

Presently there are water shortages on irrigated rotation croplands of about 80,000 acre-feet of available soil moisture under average conditions. Shortages vary from area to area within the Basin and from year to year. Average conditions were used in the analysis.

Grazing Resources

The Bureau of Land Management administers 35 percent of the total acreage in the Basin. Cattle and sheep operators rely on these lands for a large portion of their annual livestock forage requirements. Livestock using Bureau of Land Management lands obtain about 40 percent of their annual feed requirement from grazing these lands. In 1961, 47,049 cattle and 317,988 sheep utilized 563,915 animal-unit months of forage on Bureau of Land Management lands.

In 1960, 46,218 cattle and 166,275 sheep grazed 301,244 animal-unit months of forage from National Forest lands. These livestock obtained 30 percent of their annual feed requirements from this source. The National Forest lands account for about 35 percent of the area within the Basin.

In the last 15 years there has been significant reduction in the number of livestock and the animal-unit months of grazing on both National Forest and Bureau of Land Management lands. Cattle numbers were reduced by 7 percent, while sheep were reduced by 27 percent from 1945 to 1960.

It is estimated that there are 680,000 acres of State and private rangelands within the Basin and about 136,000 animal-unit months of grazing are obtained from these sources.

Reduction in the number of livestock and the amount of forage obtained from off-farm sources has put pressure on farm land and water resources.

PROCEDURES

SOURCES OF DATA

An economic investigation of water and related resources requires detailed information regarding costs and returns to resources in alternative uses as well as inventories of resources. Secondary sources were used to obtain some of the required information, but these sources were inadequate to meet the study objectives. It was necessary to collect additional information regarding the basic features of agriculture. A farm survey was completed in 1963 to obtain necessary data. The survey included 317 of the 3,052 farm operators in the Basin.

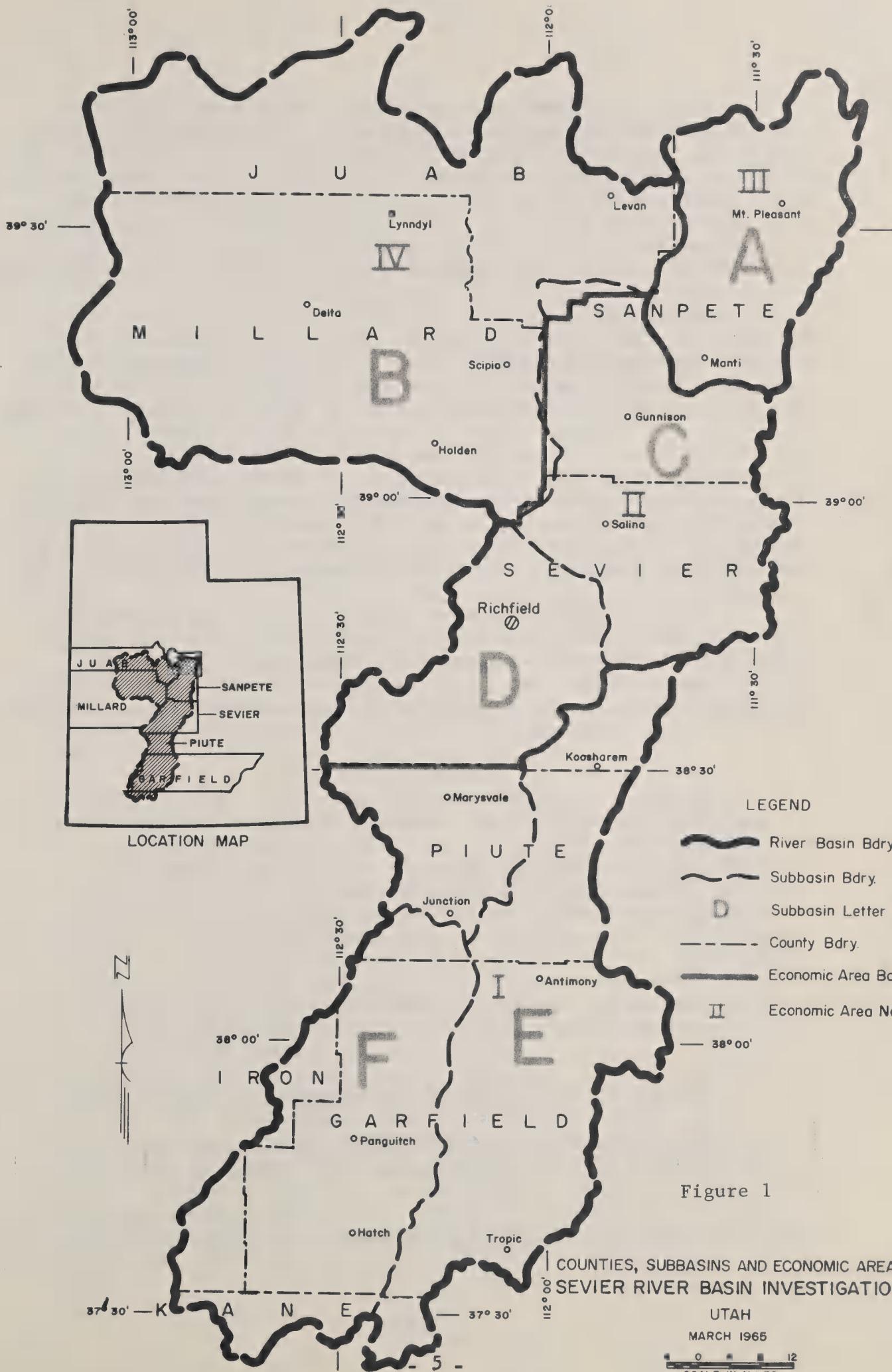
The field survey was designed to obtain costs and returns data relating to agricultural enterprises, resource requirements for various enterprises, and an inventory of resources available to individual farmers. Physical data relating to irrigation water application and crop production response and practices were also collected.

A complete inventory was made of farm land and water resources. The opportunities and associated cost of improvement practices were also determined. Development of potentially irrigable lands was limited to those under present irrigation systems. These data were provided by the Soil Conservation Service.

ECONOMIC AREAS AND SUB-BASINS

The Sevier River Basin was divided into four economic areas and six sub-basins. The economic areas encompassed geographic areas of similar agricultural activity while the sub-basins were selected on the basis of hydrology. Figure 1 is a map of the Basin showing the outlines of the sub-basins and economic areas.

Sub-basin A is the drainage of the San Pitch River above Gunnison Reservoir. Sub-basin B is all the drainage below the Sevier Bridge Reservoir. Sub-basin C comprises the drainage of the Sevier River between Sevier Bridge Reservoir and the USGS river gage near Sigurd. Sub-basin extends from Sigurd river gage upstream to the USGS river gages on the East Fork and South Fork of the Sevier River at their confluence near Kingston. Sub-basin E is the drainage of the East Fork of the Sevier River and includes the portion of the Paria River drainage around Tropic which receives water diverted from the East Fork. Sub-basin F is the drainage of the South Fork of the Sevier River above the river gage near Kingston.



Economic Area I comprises all of Sub-basins E and F plus that part of Sub-basin D which is in Piute County. This includes all the Basin area in Garfield and Piute Counties plus the Koosharem area of Sevier County. Agriculture in this area is oriented toward forage crops and livestock production. The elevation is relatively high with valleys above 6,000 feet. The growing season is consequently short. Farmers depend primarily on direct flow water rights in the Sevier River and its tributaries to provide irrigation water supplies.

Economic Area II includes all of Sub-basin C and all of Sub-basin D that lies in Sevier County. The economy is dependent primarily on raising and feeding livestock with some cash crops. Sugar beets are the principal cash crop. Irrigation water supplies come from direct flow of Sevier River tributary flows and reservoir storage.

Economic Area III has the same boundaries as Sub-basin A. The economy is dependent on forage crops and livestock. Turkey and range livestock operations dominate the economy. Range livestock operators depend heavily on Federal grazing land to provide feed for their livestock. The primary source of irrigation water is from mountain streams and springs. Some water is pumped from underground supplies.

Economic Area IV is the same as Sub-basin B. The economy is oriented toward raising and feeding livestock and cash-crop farming. Farm income from these two sources are about equal. Alfalfa hay, alfalfa seed, and wheat are the principal cash crops. Most of the irrigation water comes from reservoir storage and underground supplies.

BUDGETING METHODS

Estimates of agricultural incomes were derived by farm budgeting procedures. Farm sizes and livestock enterprises were selected to represent actual conditions as nearly as possible. Farm survey findings were used to vary farm resources and production rates between farms and economic areas. Detailed descriptions of available land and water resources, livestock enterprises, crop yields, cropping patterns, production practices and water-yield relationships are available in separate publications.^{1/} Prices used for estimating farm incomes and associated costs were based on price projections by the U. S. Department of Agriculture adjusted to fit local conditions.

1/ Wilson, David L., Agricultural Economy of the Sevier River Basin, Utah, Economic Research Service, Appendix IX, Mar. 1969, 60 pp.

Wilson, David L., Labor and Machinery Inputs and Practices, and Irrigation Water Use and Practices for Crop Production, Sevier River Basin, Utah, Economic Research Service, Appendix X, Jan. 1969, 33 pp.

Wilson, David L. and Andersen, Jay C., Some Methodological Problems in the Economic Appraisal of Increments of Irrigation Water, Sevier Valley, Utah, Economic Research Service, Appendix XII, Jan. 1969, 80 pp.

Farm types used in arriving at agricultural incomes were based on existing types of farms and available Federal grazing permits. Four farm types were predominant in the farm survey--range beef, general livestock, cash crop, and small farms. A brief description of each farm type used in the analysis follows:

Small Grade C dairy.--This farm type was used to represent the dairy enterprises and small farms. Small dairies were shown in Areas I, II, and III. The number of dairy cows per farm varied from 15 to 24. The cropping pattern was fitted to livestock feed needs.

General farms.--Feeder calves were purchased in the fall, wintered and grazed on irrigated and wet pastures the following summer and sold as grass-fat long yearlings. The size of herd varied from 90 to 180. General farms were used in Areas I and III.

Range beef farms.--Range beef farms were used in the analyses to represent the beef and sheep farms along with available Federal grazing resources. The number and size of range beef farms in each area were fitted to available off-farm grazing resources. Available grazing was divided into four periods and farm cropping patterns balanced to meet livestock feed needs. Range beef farms were shown in all areas.

Cash crop-feeder farm.--A combination of cash crop and livestock feeder farm was used in Areas II and IV to evaluate the larger, more intensive-type operations. Alfalfa hay and grain were fed to livestock with sugar beets and alfalfa seed sold for cash. The size of the feeder operations varied from 250 to 450 head.

Cash-crop farm.--Both large and small cash-crop farms were used in Area IV. Alfalfa hay, alfalfa seed and barley were produced on these farms.

All prices used for estimating farm incomes and associated costs are based on the May 1965 normalized price projections of the U. S. Department of Agriculture. State price projections were adjusted to fit local conditions.

Information obtained during the field survey showed some variations in local and State prices. For example, alfalfa hay price was lower than the State price. All prices were adjusted for marketing costs and are net prices to farmers. Prices used for selected items are shown in Table 1.

Table 1.--Projected normalized prices received and selected prices paid,
Sevier River Basin

Product	Unit	Price ^a
<u>Price received</u>		
All hay, baled ^b	Ton	21.60
Straw, baled	Ton	15.00
Corn silage	Ton	7.50
Barley	Bushel	1.05
Pasture	AUM	4.50
Sugar beets	Ton	14.50
Alfalfa seed	Pound	.40
Milk, butterfat	Pound	.83
Calves (beef steers)	Cwt.	25.50
Calves (beef heifers)	Cwt.	23.50
Long yearlings, (beef steers)	Cwt.	23.00
Long yearlings, (beef heifers)	Cwt.	21.00
Cull cows (beef)	Cwt.	13.50
Cull cows (dairy)	Cwt.	14.50
Bulls (beef)	Cwt.	17.00
Fat steers (beef)	Cwt.	25.00
<u>Prices paid</u>		
Hired labor	Hour	1.25
Custom rates:		
Baling hay	Ton	4.00
Combining grain	Acre	7.00
Chopping corn	Acre	15.00
Harvesting beets	Ton	2.10

^a Net prices received by farmers.

^b Price after shrinkage.

Source: Farm survey findings and normalized price projections by
U. S. Department of Agriculture, May 1965.

Crop yields used in estimating farm incomes are shown in Table 2. Estimates are based on farm survey findings and represent average conditions in each area. Yields are not directly comparable between areas because of varying water supplies, fertilizer use, soils and climatic conditions.

Table 2.--Crop yields used in estimating farm incomes by economic areas, Sevier River Basin

Crop	Unit	Economic Area			
		I	II	III	IV
Alfalfa hay	Ton	3.0	4.0	3.0	3.5
Meadow hay	Ton	1.75	1.75	1.75	----
Rotation pasture	AUM	6.0	6.0	6.0	----
Irrigated permanent pasture	AUM	5.0	5.0	5.0	5.0
Wet pasture	AUM	4.0	4.0	4.0	4.0
Barley	Bushel	50.0	60.0	55.0	55.0
Corn silage	Ton	----	16.0	----	15.0
Sugar beets	Ton	----	15.5	----	----
Alfalfa hay (first crop)	Ton	----	----	----	1.1
Alfalfa seed (second crop)	Pound	----	----	----	175

Farm-income budgets, representing costs and returns for all the enterprises anticipated with different farm types, were used for estimating changes in farm incomes with installation of farm improvement practices and economic effects from development of both on-farm and off-farm improvement possibilities. The evaluation procedure involved budgeting three different situations for all farm types and economic areas. These situations were as follows: (1) Present level of resource use and incomes; (2) changes from present situation and incomes with inclusion of recommended (difference between present level of practices already installed and potential level) farm improvement practices; and (3) changes from present situation and incomes with the inclusion of recommended farm improvement practices, all irrigable land (lands which are not now irrigated but could be successfully irrigated if irrigation water were available) under present irrigation systems and a full irrigation water supply for all irrigated lands.

Improvement practices, irrigable lands and irrigation water were assumed to be equally distributed on the basis of presently irrigated acreage. The evaluation of recommended improvement practices assumed that irrigation water diversions would remain the same as in the past. Irrigation water was not considered as a limiting factor in evaluating the effects of the full development of farm resources. Off-farm development opportunities are sufficient to meet the needs of irrigable lands under the present irrigation systems and also to overcome shortages on presently irrigated lands.

IMPROVEMENT PRACTICES

The evaluation of farm improvement practices was limited to irrigated-rotation cropland. Irrigated-nonrotation cropland and nonirrigated-nonrotation cropland were not considered in arriving at recommended levels of improvement practices. Sufficient data on farm improvement opportunities in wet areas was not available to provide a foundation for an area-type economic analysis. It will be necessary to evaluate these opportunities on a small-area basis because of the wide variation in physical conditions which affect the feasibility of alternative opportunities.

Farm reservoirs, ditch lining and land leveling were the improvement practices considered. Installation of ditch lining was limited to the area where land leveling was also recommended. Ditch lining was not considered in Economic Area IV.

The present level of improvement practices installed was considered in arriving at present crop yields and irrigation efficiencies. Differences between the present level and the level recommended for full development of improvement practices was used in the economic evaluation. The cost and affect of improvement practices are shown in Table 3.

Costs of improvement practices were amortized over a 50-year period using a 5-percent interest rate. On irrigable lands, an additional \$50 per acre land development cost was assumed to bring these lands to the same levels of productivity as other irrigated lands.

AGRICULTURAL INCOMES

The agricultural incomes and selected organizational items for representative farms and average farm income are shown in Tables 4 through 7. Average farm incomes varied between economic areas from a low of \$3,275 in Area I to a high of \$6,330 in Area IV. Farm incomes in Area II and III were \$5,814 and \$5,824, respectively. Weighted (farm numbers) average farm income for all operators was \$5,481.

Farm incomes do not necessarily indicate the income that farmers have available for family living expenses. Payments for interest on borrowed capital, principle payments, income taxes and social security taxes have to be paid before income for family living can be determined. Farm survey findings indicate that the average farmer also has \$2,173 of nonfarm income. Nonfarm incomes by economic areas were: Area I, \$2,405; Area II, \$2,204; Area III, \$2,302; and Area IV, \$1,757.

Table 3.- Present level of development and recommended levels of improvement practices for full development of farm resources and estimated costs by areas

Improvement practice	Unit	Area				
		I	II	III	IV	Basin
Farm reservoirs						
Present level	Acre	2,000	8,410	13,900	7,760	32,070
Recommended for full development	Acre	2,000	1,680	9,430	2,180	15,290
Per acre installation cost	Dollar	18.18	11.00	13.66	11.00	15.62
Effect on irrigation efficiency	Percent	6.00	6.00	6.00	6.00	6.00
Change in farm irrigation efficiency	Percent	.27	.12	1.14	.16	.35
Farm ditch lining						
Recommended for full development	Acre	18,105	55,520	35,290	-----	108,915
Per acre installation cost	Dollar	105.00	105.00	105.00	-----	105.00
Effect on irrigation efficiency	Percent	6.00	6.00	6.00	-----	6.00
Change in farm irrigation efficiency	Percent	2.42	3.94	4.27	-----	2.46
Land leveling						
Present level	Acre	2,945	17,540	5,480	43,220	69,185
Recommended for full development	Acre	18,105	55,520	35,290	45,700	154,615
Per acre installation cost	Dollar	57.15	54.21	64.80	48.49	55.28
Effect on irrigation efficiency	Percent	5.29	6.02	4.66	4.94	5.30
Change in farm irrigation efficiency	Percent	2.13	3.97	3.31	2.79	3.15
All improvement practices						
Average cost per irrigated acre	Dollar	63.98	99.27	112.83	23.99	71.27
Change in farm irrigation efficiency	Percent	4.82	8.03	8.27	2.95	5.88
Change in water-use efficiency	Percent	3.37	5.97	5.55	2.06	4.17

Table 4.- Agricultural incomes and organizational items for selected farm types and sizes, Economic Area I

Item	Unit	Small grade C dairy	General farm	Range beef farm	Weighted average
Farms	Number	150	75	225	450
Total land	Acre	60	493	927	566
Irrigation rotation					
cropland	Acre	30	67	112	76
Irrigated nonrotation					
cropland	Acre	9	20	34	24
Nonirrigated nonrotation					
cropland	Acre	8	18	29	21
Irrigable under system	Acre	8	16	25	18
Other	Acre	5	372	727	427
Productive livestock	Number	15	90	100	70
Operator and family labor	Hour	1,821	1,372	2,476	2,074
Investment	Dollar	26,834	55,958	92,495 ^a	64,510
Land	Dollar	12,721	35,914	61,118	40,785
Buildings & improvements	Dollar	3,375	3,136	4,236	3,766
Machinery	Dollar	5,565	6,720	8,491	7,221
Livestock	Dollar	4,650	9,540	17,950	12,115
Other	Dollar	523	648	700	623
Farm receipts	Dollar	4,802	16,624	11,222	9,982
Farm expenses ^b	Dollar	3,296	13,636	6,671	6,707
Farm income ^c	Dollar	1,506	2,988	4,551	3,275
Interest on investment ^d	Dollar	1,342	2,798	4,625	3,226
Return to labor and management	Dollar	164	190	-74	49

^a Does not include any capital investment in grazing permits.

^b Does not include interest on investment.

^c Return to labor, management and capital.

^d At 5 percent.

Table 5.- Agricultural incomes and organizational items for selected farm types and sizes, Economic Area II

Item	Unit	Small grade C dairy	Cash crop feeder farm	Range beef farm	Weighted average
Farms	Number	274	411	137	822
Total land	Acre	66	159	619	205
Irrigated cropland	Acre	39	133	45	87
Irrigated noncropland	Acre	7	-----	78	15
Nonirrigated noncrop- land	Acre	7	-----	88	17
Irrigable under system	Acre	3	9	8	7
Other	Acre	10	17	400	79
Productive livestock	Number	24	250	166	161
Operator and family labor	Hour	2,572	2,990	2,916	2,838
Investment	Dollar	40,336	105,530	108,561 ^a	84,304
Land	Dollar	18,680	47,890	65,940	41,162
Buildings & improve- ments	Dollar	5,634	3,974	4,485	4,612
Machinery	Dollar	7,646	9,976	8,491	8,952
Livestock	Dollar	7,350	42,000	28,135	28,139
Other	Dollar	1,026	1,690	1,510	1,439
Farm receipts	Dollar	7,983	28,131	14,551	19,152
Farm expenses ^b	Dollar	5,459	20,161	8,628	13,338
Farm income ^c	Dollar	2,524	7,970	5,923	5,814
Interest on investment ^d	Dollar	2,017	5,277	5,428	4,216
Return to labor and management	Dollar	507	2,693	495	1,598

^a Does not include any capital investment in grazing permits.

^b Does not include interest on investment.

^c Return to labor, management and capital.

^d At 5 percent.

Table 6.- Agricultural incomes and organizational items for selected farm types and sizes, Economic Area III

Item	Unit	Small grade C dairy	General farm	Range beef farm	Weighted average
Farms	Number	130	135	165	430
Total lands	Acre	83	500	1,146	622
Irrigated cropland	Acre	37	146	153	116
Nonirrigated noncrop- land	Acre	28	112	115	88
Irrigable under system	Acre	8	34	35	27
Other	Acre	10	208	843	391
Productive livestock	Number	24	180	185	135
Operator and family labor	Hour	2,465	2,821	3,122	2,829
Investment	Dollar	33,469	92,360	121,930 ^a	85,902
Land	Dollar	14,490	59,600	76,320	52,378
Building and improve- ments	Dollar	5,412	3,812	6,856	5,464
Machinery	Dollar	5,565	8,491	8,491	7,606
Livestock	Dollar	7,350	19,080	28,135	19,008
Other	Dollar	652	1,377	2,128	1,446
Farm receipts	Dollar	8,282	14,771	16,477	13,464
Farm expenses ^b	Dollar	5,422	6,980	9,926	7,640
Farm income ^c	Dollar	2,860	7,791	6,551	5,824
Interest on investment ^d	Dollar	1,673	4,618	6,097	4,295
Return to labor and management	Dollar	1,187	3,173	454	1,529

^a Does not include any capital investment in grazing permits.

^b Does not include interest on investment.

^c Return to labor, management and capital.

^d At 5 percent.

Table 7.- Agricultural incomes and organizational items for selected farm types and sizes, Economic Area IV

Item	Unit	Small cash crop	Large cash crop	Cash crop feeder farm	Range beef	Weighted average
Farms	Number	150	300	50	200	700
Total land	Acre	75	400	875	1,100	564
Irrigated cropland	Acre	29	154	336	95	123
Irrigated noncropland	Acre	-----	-----	-----	6	2
Nonirrigated noncrop- land	Acre	-----	-----	-----	225	64
Irrigable under system	Acre	8	43	94	134	65
Other	Acre	38	203	445	640	310
Productive livestock	Number	-----	-----	450	249	103
Operator and family labor	Hour	484	1,553	3,492	3,660	2,065
Investment	Dollar	11,228	65,147	205,188	149,435 ^a	87,678
Land	Dollar	7,980	50,450	93,820	90,169	55,795
Buildings and improve- ments	Dollar	732	1,794	8,497	6,949	3,518
Machinery	Dollar	2,506	12,093	14,711	8,491	9,544
Livestock	Dollar	-----	-----	84,000	42,210	18,060
Other	Dollar	10	-----	4,160	1,616	761
Farm receipts	Dollar	2,239	12,259	44,713	21,505	15,072
Farm expenses ^b	Dollar	1,455	5,145	31,822	13,834	8,742
Farm income ^c	Dollar	784	7,114	12,891	7,672	6,330
Interest on investment ^d	Dollar	561	3,257	10,259	7,472	4,384
Return to labor and management	Dollar	223	3,857	2,632	199	1,946

^aDoes not include any capital investment in grazing permits.

^bDoes not include interest on investment.

^cReturn to labor, management and capital.

^dAt 5 percent.

Capital requirements for all operators averaged \$81,865. Comparable figures by economic areas were Area I, \$64,510; Area II, \$84,304; Area III, \$85,902; and Area IV, \$87,678.

The returns to operators for their labor and management averaged \$1,397. Within economic areas, returns for labor and management were the lowest in Area I (\$49) and the highest in Area IV (\$1,946). Farmers in Area II received \$1,598 and farmers in Area III, \$1,529. Returns by types of farms varied from a minus \$74 for range beef farms in Area I to \$3,857 on large cash-crop farms in Area IV.

IMPACTS OF FARM IMPROVEMENT PRACTICES AND FULL DEVELOPMENT

ECONOMIC AREA I

The installation of recommended improvement practices would increase the present farm irrigation efficiency by 4.8 percent and the overall area water-use efficiency by 3.4 percent. In addition to increasing irrigation efficiency, installed practices would also reduce farm labor requirements and provide small increases in crop yields through better distribution of irrigation water to the crop root zone. Irrigation water diversion requirements could be reduced by 18,500 acre-feet and still have a full water supply on presently irrigated lands. The amortized annual cost of these practices would be \$162,800 and the annual direct agricultural benefits \$115,200 (Table 8). However, the value of the 18,500 acre-feet reduced diversion requirements should be considered when comparing benefits and costs of improvement practices.

With full development of farm resources, the annual direct agricultural benefits would be about \$333,500 and the annual development cost about \$223,700. The \$109,800 difference between benefits and costs would be available to pay the costs of the additional 10,000 acre-feet of irrigation water necessary to irrigate the 8,000 acres of additional irrigable lands. This irrigation water could be obtained from improving the 290 miles of distribution canals and draining all or part of the 4,000 acres of low-value phreatophyte areas. Present losses from distribution canals are 55,000 acre-feet annually. Over 13,000 acre-feet of water are also being consumptively used by nonbeneficial phreatophytes. In general terms, there are more than enough off-farm water development opportunities for improvement practices to provide all irrigable lands under the present irrigation systems with a full water supply.

Table 8.- Estimated costs and changes in net farm incomes with addition of farm improvement practices, irrigable lands under present irrigation systems and full water supply for all irrigated lands, Economic Area I

Item	Unit	Present situation	Addition of recommended farm improvement practices	Addition of practices, irrigable acreage and full water supply to all lands ^a
<u>Cropland</u>				
Irrigated rotation	Acres	55,880	55,880	63,884
Irrigated nonrotation	Acres	35,717	35,717	43,721
Nonirrigated non- rotation	Acre	10,733	10,733	10,733
<u>Level of improvement practices</u>				
Farm reservoirs	Acre	2,000	4,000	4,900
Farm ditch lining	Acre	-----	18,105	22,165
Land leveling	Acre	2,945	21,050	25,760
<u>Farm income affects</u>				
Net farm income ^b	Dollar	49	205	1,230
Cost of labor ^c	Dollar	-----	+100	-403
Adjusted net farm income	Dollar	49	305	827
<u>Annual area income affects</u>				
Amortized cost of de- velopment ^d	Dollar	-----	162,800	223,700 ^e
Direct agricultural benefits	Dollar	-----	115,200	333,500 ^f
<u>Area change in water use</u>				
Consumptive use by crops	Ac. ft.	-----	0	+15,020
Irrigation diversion needs	Ac. ft.	-----	-18,500	+10,000

^aRepresents the change in resource use and incomes from the present situation to the situation with the installation of farm improvement practices and a full irrigation water supply to all irrigated lands.

^bReturn to operator and family labor and management.

^cAdjusted to reflect the saving or cost of operator and family labor resulting from development at \$1.25 per hour.

^dCost of improvement practices is amortized over a 50-year period at 5 percent interest.

^eA \$50 per acre land development cost, in addition to costs of improvement practices, was assumed to bring irrigable lands to present level of productivity of other presently irrigated lands.

^fBenefits discounted to allow for a 3-year development period.

ECONOMIC AREA II

The installation of recommended improvement practices would increase the average farm irrigation efficiency by 8.0 percent and the overall area water-use efficiency by 6.0 percent. Additional water would be available to crops and increased yields would result from practices. Farm labor requirements for irrigating would also be reduced. Present diversion requirements would be reduced by 6,600 acre-feet in addition to providing 18,400 acre-feet more water to crops. The annual direct agricultural benefits from practices would be about \$642,000. Amortized annual costs of practices would be \$485,200. Available income to farm operators would be increased by \$156,800 a year in addition to reducing irrigation water diversion requirements. (Table 9)

With full development of all available farm resources the annual direct agricultural benefits would be about \$943,700. Amortized annual development costs would be \$538,800. The \$404,900 of excess benefits over costs would be available to pay the costs of the additional 13,400 acre-feet of irrigation water necessary to irrigate the 5,400 acres of additional irrigable lands. This additional irrigation water could be obtained from improving the 420 miles of distribution canals and draining the 6,280 acres of low-value phreatophyte areas. Present losses from these sources amount to about 100,000 acre-feet annually. The groundwater resource could be developed to insure that seasonal and dry-year shortages are overcome. In general terms, there are more than enough off-farm water development opportunities to provide all irrigable lands under the present irrigation systems with a full water supply.

ECONOMIC AREA III

The installation of recommended farm improvement practices would result in improving the average farm irrigation efficiency by 8.7 percent and the area water-use efficiency by 5 percent. Additional water would be available to crops and increased yields would result from practices. Farm labor requirements for irrigating would also be reduced. Present diversion requirements would not be affected, but 8,060 acre-feet additional water would be available to crops as a result of practices. The annual direct agricultural benefits from practices would be about \$354,800. Amortized annual costs of practices would be \$335,300. (Table 10)

With full development of all available farm resources, the annual direct agricultural benefits would be about \$870,100. Amortized annual development costs would be \$444,700. The \$425,400 of excess benefits over costs would be available to pay the costs of the additional 64,500 acre-feet of irrigation water necessary to irrigate the 11,550

Table 9.- Estimated costs and changes in net farm incomes with addition of farm improvement practices, irrigable lands under present irrigation systems and full water supply for all irrigated lands, Economic Area II

Item	Unit	Present situation	Addition of recommended farm improvement practices	Addition of practices, irrigable acreage and full water supply to all lands ^a
<u>Cropland</u>				
Irrigated rotation	Acre	104,600	104,600	110,030
Irrigated nonrotation	Acre	76,150	76,150	81,580
Nonirrigated non-rotation	Acre	13,080	13,080	13,080
		15,370	15,370	15,370
<u>Level of improvement practices</u>				
Farm reservoirs	Acre	8,410	10,090	10,810
Farm ditch lining	Acre	-----	55,520	59,480
Land leveling	Acre	17,540	73,060	78,270
<u>Farm income affects</u>				
Net farm income ^b	Dollar	1,598	2,271	2,799
Cost of labor ^c	Dollar	-----	+108	+4
Adjusted net farm income	Dollar	1,598	2,379	2,803
<u>Annual area income affects</u>				
Amortized cost of development ^d	Dollar	-----	485,200	538,800 ^e
Direct agricultural benefits	Dollar	-----	642,000	943,700 ^f
<u>Area change in water use</u>				
Consumptive use by crops	Ac. ft.	-----	+18,380	+30,630
Irrigation diversion needs	Ac. ft.	-----	-6,600	+13,400

^a Represents the change in resource use and incomes from the present situation to the situation with the installation of farm improvement practices and a full irrigation water supply to all irrigated lands.

^b Return to operator and family labor and management.

^c Adjusted to reflect the saving or cost of operator and family labor resulting from development at \$1.25 per hour.

^d Cost of improvement practices is amortized over a 50-year period at 5 percent interest.

^e A \$50 per acre land development cost, in addition to costs of improvement practices, was assumed to bring irrigable lands to present level of productivity of other presently irrigated lands.

^f Benefits discounted to allow for a 3-year development period.

Table 10.- Estimated costs and changes in net farm incomes with addition of farm improvement practices, irrigable lands under present irrigation systems and full water supply for all irrigated lands, Economic Area III

Item	Unit	Present situation	Addition of recommended farm improvement practices	Addition of practices, irrigable acreage and full water supply to all lands ^a
<u>Cropland</u>				
Irrigated rotation	Acre	93,150	93,150	104,700
Nonirrigated non- rotation	Acre	54,250	54,250	65,800
		38,900	38,900	38,900
<u>Level of improvement practices</u>				
Farm reservoirs	Acre	13,900	23,300	28,300
Farm ditch lining	Acre	-----	35,290	42,800
Land leveling	Acre	5,480	40,770	49,450
<u>Farm income affects</u>				
Net farm income ^b	Dollar	1,589	2,326	4,119
Cost of labor ^c	Dollar	-----	+88	-406
Adjusted net farm income	Dollar	1,589	2,414	3,713
<u>Annual area income affects</u>				
Amortized cost of development ^d	Dollar	-----	335,300	444,700 ^e
Direct agricultural benefits	Dollar	-----	354,800	870,100 ^f
<u>Area change in water use</u>				
Consumptive use by crops	Ac. ft.	-----	+8,060	+37,100
Irrigation diversion needs	Ac. ft.	-----	0	+64,500

^a Represents the change in resource use and incomes from the present situation to the situation with the installation of farm improvement practices and a full irrigation water supply to all irrigated lands.

^b Return to operator and family labor and management.

^c Adjusted to reflect the saving or cost of operator and family labor resulting from development at \$1.25 per hour.

^d Cost of improvement practices is amortized over a 50-year period at 5 percent interest.

^e A \$50 per acre land development cost, in addition to costs of improvement practices, was assumed to bring irrigable lands to present level of productivity of other presently irrigated lands.

^f Benefits discounted to allow for a 3-year development period.

acres of additional irrigable lands and provide a full water supply to presently irrigated lands. This additional irrigation water would have to be obtained by improving distribution facilities and draining wet areas. Complete development of all potential off-farm resources would be required to obtain enough water to irrigate irrigable lands. It would be necessary to develop the potential groundwater resource to insure that seasonal and dry-year irrigation water shortages are overcome.

ECONOMIC AREA IV

The installation of recommended farm improvement practices could increase the average farm irrigation efficiency by 3.0 percent and the overall area water-use efficiency by 2.1 percent. Additional water would be available to crops and increased yields would result from practices. Farm labor requirements for irrigating would also be reduced. Diversion requirements would remain the same but 4,400 acre-feet of additional water would be available to crops. The annual direct agricultural benefits from practices would be \$476,000 with amortized annual costs of \$122,700. Income available to farm operators would be increased by \$353,300 a year by installing practices. (Table 11)

With the development of all available farm resources the annual direct agricultural benefits would be about \$2,777,600. Amortized annual farm development costs would be \$366,100. Farmers would have available \$2,411,500 income to offset the cost of obtaining the additional 295,800 acre-feet of irrigation water needed to irrigate the 45,370 acres of additional irrigable lands and provide a full water supply to presently irrigated lands.

Potential off-farm improvement practices in Economic Area IV are not sufficient to provide necessary water for the development of all irrigable land under the present irrigation systems. However, development of all potential sources of water in Economic Areas I and II would provide enough irrigation water to supply the irrigable lands under the present irrigation system in Economic Area IV in addition to their own needs. This assumes that irrigable lands above present irrigation systems would not be developed.

SEVIER RIVER BASIN

The installation of recommended farm improvement practices would increase the average farm irrigation efficiency by 5.9 percent and the overall Basin water-use efficiency by 4.2 percent. Diversion requirements would be reduced by 25,100 acre-feet and consumptive use by crops increased by 30,840 acre-feet as a direct result of farm improvement

Table 11.- Estimated costs and changes in net farm incomes with addition of farm improvement practices, irrigable lands under present irrigation systems and full water supply for all irrigated lands, Economic Area IV

Item	Unit	Present situation	Addition of recommended farm improvement practices	Addition of practices, irrigable acreage and full water supply to all lands ^a
<u>Cropland</u>				
Irrigated rotation	Acre	138,460	138,460	183,830
Irrigated non-rotation	Acre	92,240	92,240	137,610
Nonirrigated non-rotation	Acre	1,120	1,120	1,120
<u>Level of improvement practices</u>				
Farm reservoirs	Acre	7,760	9,940	14,830
Land leveling	Acre	43,220	88,920	132,660
<u>Farm income affects</u>				
Net farm income ^b	Dollar	1,946	2,541	6,352
Cost of labor ^c	Dollar	-----	+85	-241
Adjusted net farm income	Dollar	1,946	2,626	6,111
<u>Annual area income affects</u>				
Amortized cost of development ^d	Dollar	-----	122,700	366,100 ^e
Direct agricultural benefits	Dollar	-----	476,000	2,777,600 ^f
<u>Area change in water use</u>				
Consumptive use by crops	Ac. ft. ⁿⁱ	-----	+4,400	+143,050
Irrigation diversion needs	Ac. ft.	-----	0	+295,800

^a Represents the change in resource use and incomes from the present situation to the situation with the installation of farm improvement practices and a full irrigation water supply to all irrigated lands.

^b Return to operator and family labor and management.

^c Adjusted to reflect the saving or cost of operator and family labor resulting from development at \$1.25 per hour.

^d Cost of improvement practices is amortized over a 50-year period at 5 percent interest.

^e A \$50 per acre land development cost, in addition to costs of improvement practices, was assumed to bring irrigable lands to present level of productivity of other presently irrigated lands.

^f Benefits discounted to allow for a 3-year development period.

practices. The annual direct agricultural benefits from practices would be \$1,588,000 with amortized annual costs of \$1,106,000. Income available to farm operators would be increased by \$482,000 annually. (Table 12)

With the development of all available farm resources an additional 70,350 acres of irrigable lands under the present irrigation systems could be irrigated. Diversion requirements would be increased by 383,700 acre-feet and consumptive use by crops increased by 225,800 acre-feet. The annual direct agricultural benefits would be \$4,924,900 with annual amortized costs of \$1,573,300. Farmers would have available \$3,351,600 additional income to offset the off-farm development costs necessary to obtain the additional 383,700 acre-feet of irrigation water at the point of diversion necessary to provide a full water supply to all irrigated lands.

Potential off-farm improvement practices would provide more than enough irrigation water for a full water supply to all potentially irrigable lands under the present irrigation systems. It is estimated that water-salvage projects on wet areas would provide 215,000 acre-feet of additional irrigation water.

LOCAL AND REGIONAL INCOME AFFECTS

The annual local income impacts resulting from recommended farm improvement practices would be \$630,000. Regional income impacts would be \$964,000. Over the 50-year evaluation period this means \$31.5 million added income to the local economy and \$48.2 million increased income to the regional (State) economy. Agricultural employment in the Basin would be reduced by 25 full-time jobs and offset by 40 additional full-time jobs in the trade and service industries.

With full development of all available farm resources the annual local income would be increased by \$4,391,000. Regional income impacts would be \$6,703,000 annually. Over the evaluation period there would be \$219.6 million added income to the local economy and \$335.2 million increased income to State economy. Agricultural employment in the Basin would be increased by 208 full-time jobs and 335 additional full-time jobs in the trade and service sector.

Table 12.- Estimated costs and changes in net farm incomes with addition of farm improvement practices, irrigable lands under present irrigation systems and full water supply for all irrigated lands, Sevier River Basin

Item	Unit	Present situation	Addition of recommended farm improvement practices	Addition of practices, irrigable acreage and full water supply to all lands ^a
<u>Cropland</u>				
Irrigated rotation	Acre	392,090	392,090	462,444
Irrigated non-rotation	Acre	258,357	258,357	328,711
Nonirrigated non-rotation	Acre	24,933	24,933	24,933
		108,800	108,800	108,800
<u>Level of improvement practices</u>				
Farm reservoirs	Acre	32,070	47,360	58,840
Farm ditch lining	Acre	-----	108,915	124,445
Land leveling	Acre	69,185	223,800	286,140
<u>Farm income affects</u>				
Net farm income ^b	Dollar	1,408	1,972	3,777
Cost of labor ^c	Dollar	-----	+96	-217
Adjusted net farm income	Dollar	1,408	2,068	3,560
<u>Annual area income affects</u>				
Amortized cost of development ^d	Dollar	-----	1,106,000	1,573,300 ^e
Direct agricultural benefits	Dollar	-----	1,588,000	4,924,900 ^f
<u>Area change in water use</u>				
Consumptive use by crops	Ac. ft.	-----	+30,840	+225,800
Irrigation diversion needs	Ac. ft.	-----	-25,100	+383,700

^a Represents the change in resource use and incomes from the present situation to the situation with the installation of farm improvement practices and a full irrigation water supply to all irrigated lands.

^b Return to operator and family labor and management.

^c Adjusted to reflect the saving or cost of operator and family labor resulting from development at \$1.25 per hour.

^d Cost of improvement practices is amortized over a 50-year period at 5 percent interest.

^e A \$50 per acre land development cost, in addition to costs of improvement practices, was assumed to bring irrigable lands to present level of productivity of other presently irrigated lands.

^f Benefits discounted to allow for a 3-year development period.

